

ARCHIVED REPORT

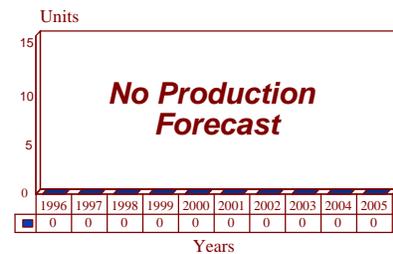
For data and forecasts on current programs please visit
www.forecastinternational.com or call +1 203.426.0800

MCM-1 Avenger Class - Archived 9/97

Outlook

- All members of class now in service
- No future construction planned

10 Year Unit Production Forecast
1996 - 2005



Orientation

Description. The Mine Countermeasures Ships (MCM) are fiberglass-sheathed wood-hulled ocean minesweeping vessels. The vessels are equipped with advanced mine location and neutralization systems, and their primary mission is to locate and destroy sea mines.

Sponsor

United States Department of Defense
 United States Navy
 Naval Sea Systems Command
 Crystal City
 Virginia
 United States of America

Contractors

Peterson Builders
 Sturgeon Bay
 Wisconsin
 United States of America

Marinette Marine

Marinette
 Wisconsin
 United States of America

Licensee. No production licenses have been granted.

Status. In service.

Total Produced. A total of 14 ships are in service.

Platform

Ship	Builder	Ordered	Commissioned
MCM-1 <i>Avenger</i>	Peterson	FY82	9/1987
MCM-2 <i>Defender</i>	Marinette	FY83	9/1989
MCM-3 <i>Sentry</i>	Peterson	FY84	9/1989
MCM-4 <i>Champion</i>	Marinette	FY84	1/1991
MCM-5 <i>Guardian</i>	Peterson	FY84	12/1989
MCM-6 <i>Devastator</i>	Peterson	FY85	10/1990
MCM-7 <i>Patriot</i>	Marinette	FY85	10/1991
MCM-8 <i>Scout</i>	Peterson	FY85	12/1990

Ship	Builder	Ordered	Commissioned
MCM-9 <i>Pioneer</i>	Peterson	FY87	12/1992
MCM-10 <i>Warrior</i>	Peterson	FY87	4/1993
MCM-11 <i>Gladiator</i>	Peterson	FY87	9/1993
MCM-12 <i>Ardent</i>	Peterson	FY90	2/1994
MCM-13 <i>Dexterous</i>	Peterson	FY90	6/1994
MCM-14 <i>Chief</i>	Peterson	FY90	9/1994

Application. The MCM-1 class are intended to perform open ocean and coastal mine clearance in conjunction with ships of the MHC-1 coastal minehunter class.

Price Range. This class has a unit price of approximately US\$117.7 million.

Technical Data

Characteristics

Crew: 8 officers, 75 enlisted
 Speed: 13.5 knots

Dimensions

	Metric	US
Length:	68.3 m	224 ft
Beam:	11.9 m	39 ft
Draft:	3.5 m	11.5 ft
Displacement (full load)		1,312 tons

Armament

	Type	Quantity
Weapons	M-2HB machine gun	2

Electronics

	Type	Quantity
Radars	SPS-55	1
Sonars		
MCM-1 to -9	SSQ-30	1
MCM-10 to -14	SSQ-32	1
Sweep:		
Active acoustic:	SLQ-37(V)	2
Magnetic:	SLQ-38	1
Submersible:	SLQ-48	2
Combat system:	SYQ-15	1

Propulsion

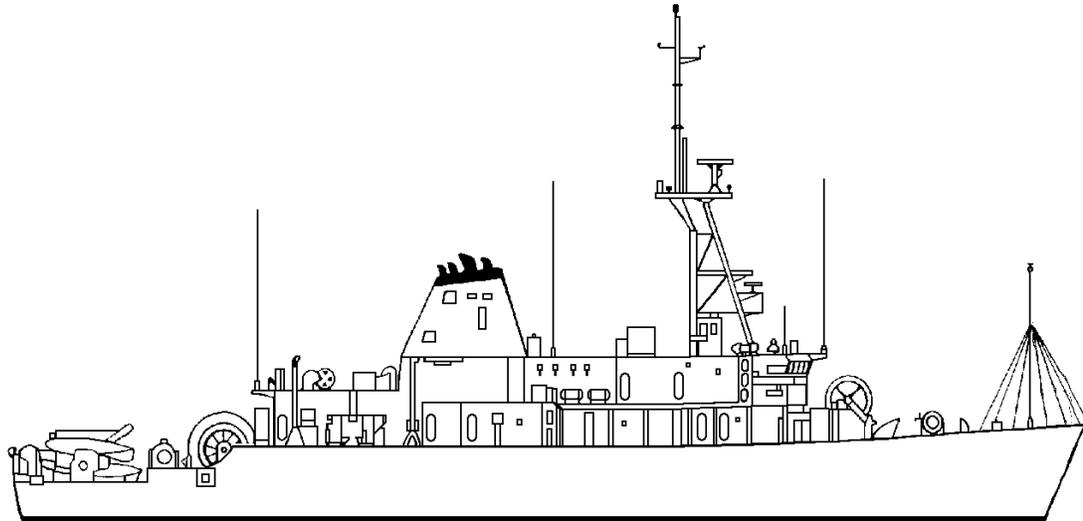
	Type	Quantity
Main engine	Diesel	
(MCM-1 and -2)	Waukesha L-1616	2
(MCM-3 to -14)	Isotta-Fraschini ID36SS 6V-AM	2
Auxiliary engine	Hansome electric motor	2
	Omnithruster (bow)	1
Propellers	Controllable pitch	2
Generators		
(MCM-1 and -2)	Waukesha L-1616 diesel	3
(MCM-3 to -14)	Isotta-Fraschini ID 36 SS 6V-AM diesel	3

Design Features. The MCM-1 Avenger class was built to commercial standards, where possible, to save costs. The hull consists of four layers of timber (Oak, Douglas Fir and Alaskan Cedar), the layers arranged so that the grain of each layer is at 90° to that underneath. This composite is coated with a thin skin of glass-reinforced plastic. This configuration was chosen to exploit the nonmagnetic

characteristics of wood while the GRP coating was intended to reduce the maintenance costs and durability problems normally associated with timber construction. A subsidiary point was that extensive woodworking facilities were common in the US while GRP construction capabilities of the required size were not.

Operational Characteristics. The MCM-1 class are equipped with several new systems, including the SLQ-48 Mine Neutralization Vehicle. The first nine ships have the SQQ-30 minehunting sonar. This variable-depth sonar has two units: a search and detection sonar and a high-frequency, high-resolution classification sonar. The system is lowered from a cable drum that is located forward of the superstructure. The later units of the class will have the SSQ-32, which also is a variable-depth sonar but of more advanced design. The SQQ-32 will be retrofitted to the earlier ships in the class at a future date.

The MCM-1 Avenger class also carries the SSN-2 precise navigation system, which was tested in the late 1970s aboard three Military Sealift Command ships and one oceangoing minesweeper. This forms a component of the overall SYQ-15 mine warfare combat system. The SYQ-15 draws heavily on the British NAUTIS-M system used on the Sandown class. The Avenger class carries the SLQ-48, a remotely controlled mine neutralization system, a remotely operated vehicle with 1,524 meters (5,000 feet) of cable with cutters and explosive charges.



MCM-1 AVENGER

Source: Forecast International

Variants/Upgrades

The first pair of ships have Waukesha diesels. These proved most unsatisfactory and have been replaced by Isotta Fraschini engines in the remainder.

The first nine of the class have the SQQ-30 minehunting sonar system, but the last five have the substantially more capable SQQ-32. The SQQ-32 will be back-fitted to earlier members of the class.

Program Review

Background. In presenting its FY78 budget request, the US Navy set out a 19-ship procurement objective for a new mine countermeasure vessel (MCM). The tentative program called for US\$60 million in FY79 for the lead ship, followed by six vessels each in the following three fiscal years. The projected total program cost for 19 ships was US\$1.16 billion, excluding outfitting and post delivery costs. The FY79 budget request did not ask for any vessels, but the Five Year Shipbuilding Plan for FY79 through FY83 called for one vessel in FY80 and two in FY81, two in FY82 and two in FY83. Again, in the FY80 budget request, the service did not ask for funding, but the

FY80 Five Year Shipbuilding Plan had one vessel in FY81 and two each in FY83 and 1984. Defense Secretary Brown told Congress that "MCM shipbuilding plans have been delayed for a year while mine hunting hardware is developed and ship design is modified."

A presolicitation notice for ship systems design support and future construction was issued in July 1979. The notice indicated that the new ship would be 60.96 meters (200 feet) in length and would displace about 1,100 tons fully loaded. The previous MCM ship design called for a ship 76.2 meters (250 feet) in length. The ship was to be

built to commercial standards where feasible to minimize construction costs. In the US Navy's FY83 Five Year Shipbuilding Plan, the MCM program suffered another construction delay, with lead ship funding delayed until FY82. The delay was due to a redesigning of the ship to make it smaller and more cost-effective. Compared to the FY81 plan, the total number of ships was dropped from 19 to 14.

On June 29, 1982, the US Navy awarded Peterson Builders a US\$64.4 million contract for the lead ship of the new MCM-1 Avenger class. The contract, valued at US\$46.6 million, for the second vessel was awarded to Marinette on May 2, 1983. In FY83, the US Navy asked for and received funding for four MCM vessels. Again, the US Navy requested funding for four more vessels in FY84. Congress cut back the funding from US\$390.4 million to US\$301.0 million for three ships. On December 23, 1983, the US Navy awarded two contracts for three of the four vessels funded in FY84. Marinette received US\$41.9 million for one vessel, while Peterson received US\$74.7 million for two ships. On July 24, 1984, Alliant's (then Honeywell) Marine Systems Division received a US\$30.1 million contract to produce six Mine Neutralization Systems for the MCM ship program.

The MCM-1 program suffered several major delays in 1985 due to problems with the diesel engines. The lead ship, the *USS Avenger*, was launched in June 1985 and was scheduled for commissioning later that year. During engine tests conducted shortly after its launching, it was discovered that its main engines rotated counter to its gear boxes. Additional problems developed, when the replacement Isotta Fraschini engines failed to pass the US Navy's endurance tests. The US Navy held tests on the MCM-1 class engines throughout 1985 and early 1986, and solved most of the problems by May 1986. However, more problems developed in early 1986, when a report by Peterson Shipbuilders said that the Waukesha diesel engines used aboard the first two ships allowed engine oil to enter the exhaust stack, creating a fire hazard. These problems were corrected by mid-1986.

The US Navy asked for US\$334.1 million for four Avenger class ships in FY86. This was raised by US\$197.2 million. The US Navy's problems with the MCM-1 Avenger class continued into 1987. Construction and engineering problems continued, and as a result, the US Navy held off ordering the FY85 vessels until the late summer 1986. On August 20, 1986, the US Navy issued Peterson Shipbuilders a US\$96.5 million contract for two ships, while Marinette Marine received a US\$51.8 million contract for one ship. Due to continuing problems with the program, the US Navy decided not to order the fourth ship and a decision was made to reprogram the funds to cover the costs of repairing the engines aboard the earlier ships.

No MCM vessels were asked for in the FY87 budget request. The FY88 request asked for US\$292.3 million for three vessels. After two Senate and two House committees voted not to fund any MCM warship construction in FY88, the US Navy withdrew the program from the budget. Although some congressmen castigated the program, citing its numerous delays and problems, many told the US Navy to put the ships in a future budget request to provide work for the depressed shipbuilding industry in the United States.

Throughout 1986 and early 1987, work on the ships progressed at a very slow pace. No keels were laid between May 1985 and February 1987, but by June 1987, the first eight MCM keels had all been laid. On September 12, 1987, the *USS Avenger* (MCM-1) was commissioned. This was over two years behind the original schedule.

On February 14, 1989, Peterson Builders received a contract for MCM-9, MCM-10, and MCM-11, the three FY87 ships. The US Navy had postponed placing this order until it saw progress in program construction and operations. When the US Navy issued its FY90 budget request in February 1989, it asked for US\$341.5 million for the last three MCM-1 class ships.

In late 1990s, and early 1991, the Avenger Class saw its combat debut when the *USS Avenger* assisted other allied mine warfare craft. These operations ensured that the damage from Iraqi mines was light. Although the brunt of the clearance activities were undertaken by the Royal Navy with mainly French support, the limited participation of the *USS Avenger* in these operations demonstrated the continuing need and value of the mine warfare ships. A downside to the operation was that the unreliability of the Avenger class was clearly demonstrated with the ship spending much of its time down for remedial maintenance (the *USS Avenger* had been taken to the Gulf on a heavy lift ship since its engine problems made it incapable of making the voyage on its own).

The shock testing of the *USS Avenger* was undertaken in 1991. The results were extremely mixed. Although the ship survived, inspection after the shock testing revealed cracks had been formed in the GRP covering. According to the US Navy, these cracks were not significant since "... the cracks are due to improper application ... they do not present a problem." Other naval architects disputed this assessment, pointing out that the cracked GRP negated the protection of the wooden hull and was likely to result in accelerated decay. They also pointed out that the US Navy shock tests were much less demanding than those routinely imposed on Royal Navy MCMVs and an RN-style test (with the shock charge exploded directly under the keel) would have resulted in significantly greater damage.

In 1992, the US Navy completed an analysis of "lessons learned" during the Second Gulf War and other post-Second World War mine crises. Planners accomplished a comprehensive reassessment of requirements for effective mine warfare forces in the post-Cold War era. The Chief of Naval Operations approved the US Navy's *Mine Warfare Plan: Meeting the Challenges of an Uncertain World*, an overview of the worldwide mine threat to the projection of power by joint US military forces. It was a review of national security policy and strategic imperatives for mines and mine countermeasures.

Based on the Mine Warfare Plan, the Navy reorganized its mine warfare forces during 1992, developing a unified Mine Warfare command structure, placing all Mine Countermeasures Groups under the command of the Commander, Mine Warfare Command. The new structure was developed in response to lessons learned during the Persian Gulf War. The reorganization placed all mine warfare assets under the operational control of a full-time flag officer. The goal was to provide for deployable mine countermeasures group commanders and forces to support forward-deployed battle groups and amphibious operations. The reorganization would collocate the mine warfare forces and establish a Mine Warfare center of Excellence at a single site (Ingleside in Texas).

An ongoing debate developed, much of it prompted by complaints from facilities from which mine warfare forces would be moved. Congressional action called for a review

of the cost-effectiveness of the move. In the *FY93 Department of Defense Authorization Act* Congress restricted the ability of the Secretary of the Navy to finalize the Ingleside move until reporting on the move plan and evaluating other porting alternatives. This report was submitted to Congress January 15, 1993.

Under the reorganization, there would be two deployable mine countermeasures group commanders and staffs to support two concurrent, but geographically separated major regional contingencies. Liaison officers from the mine countermeasures group commander's staffs will coordinate with theater commanders-in-chief. Operationally, they embark on a mine countermeasures command-and-support ship. A national force would have a minimum of four MCM/ MHC-class ships, six-to-eight helicopters, and three explosive ordnance disposal detachments under the command of a Mine Countermeasures Group Commander. The Commander, Mine Warfare Command, could deploy in-theater with the group commanders and forces, if necessary.

The US Navy's Mine Warfare Plan provides for a force level of 14 MCM-1 *Avenger*-class mine countermeasures ships, all in the active force. No additional procurement is envisaged. Industry sources report that, as of May 1995, 11 of the 14 MCM-1 class ships were tied up alongside at Ingleside with engine problems. We have been unable to confirm this.

Funding

The funding line for this program is complete with the last three ships ordered in FY90. No additional ships will be ordered.

Recent Contracts

Contractor	Award (\$ millions)	Date/Description
Crane Defense Systems	17.3	August 1990 - FFP for OK-520/SQQ common winch assemblies and engineering support for MCM and MHC class ships (N00024-90-C-6113).

Timetable

	1978	United States Navy considered designs for new mine warfare ships
Jul	1979	Navy issued bid for ship system design support
	FY81	US Navy issued bid for ship design and construction
Jun	1982	Peterson Shipbuilders received contract for MCM-1
May	1983	Marinette Marine received contract for MCM-2
Dec	1986	<i>USS Avenger</i> (MCM-1) began sea trials
Sep	1987	<i>USS Avenger</i> commissioned

Oct	1989	Last three ships of the class ordered
Early	1991	<i>USS Avenger</i> in service in Second Gulf War
	1991	Shock test completed

Worldwide Distribution

USA - (14)

Forecast Rationale

The Avenger class represent a bridge between the older wooden-hulled generations of US minehunters and the new generation of GRP-hulled designs. The design concept of skinning wood with GRP is an attempt to combine the individual advantages of both construction methods. All too often, the result is to combine the worst features of both. Even if the mixed construction technique is successful, GRP is too effective of a technology to lose any market share to an Avenger type structure. However ingenious, the laminated wood/GRP skin is an engineering dead-end.

With the commissioning of the last ship in the class, the Avenger program has come to an end. No further procurement is envisaged for US requirements since the smaller and less expensive MHC-51 is as capable (and probably more so) than this oversized and over-manned class. The MCM-1 is the largest MCMV built since the Second World War and has the largest crew of any Western designed mine warfare ship. Both attributes conspire to rule it out of any probable export competition. This program is therefore ended and no forecast is recorded. This report will be dropped next year.

Ten-Year Outlook

**** No production is forecast. ****

* * *